

# AV-TC 30 CBL

Time Code Converter





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# Operating Manual AV-TC 30 CBL

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## A1 Safety Instructions

- General rules:** Only use the device as directed in a dry atmosphere. Treat the AV-TC 30 CBL with the same care as other studio devices. Please follow the advice in the following operators manual. Whenever it is likely that safe operation is impaired, the instrument must be made inoperative and secured against unintended operation. The appropriate service authority must then be informed.
- Damages in transit:** If the device shows obvious damages from transit the shipper in question must be notified and the dealer must be informed.
- Positioning:** Position device only where sufficient air circulation can be maintained. Extreme temperatures, dust, humidity, shocks and strong electromagnetic fields must be avoided.
- Maintenance:** Use a moist soft textured fabric cloth when cleaning the housing. Do not use polish or any other cleaning agents.
- Repairs:** The AV-TC 30 CBL does not require any extra maintenance. There are no user serviceable parts inside the device. Repairs should be sent to an authorized service partner.
- EMC:** The EMC regulations are observed only under the following condition: use high quality shielded cables at data inputs and outputs.

## A2 Copyright

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# *Alpermann+Velte*

## A3 CE Declaration of conformity

We,

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herewith declare under our sole responsibility that the

### AV-TC 30 CBL

meets the intent of the following directives, standards and specifications:

89/336/EEC Electromagnetic Compatibility

EN 50081-1 Emissions

- EN 55022
- EN 55103-1

EN 50082-1 Immunity

- EN 55024
- EN 55103-2



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# 1 Functions Overview

The AV-TC 30 CBL consists of a LTC generator, a LTC reader, a forward/reverse pulse counter, and optionally of a VITC generator. The unit enables the following functions:

- Conversion of pulses to Time Code. The pulse may be biphasic (2-phase square pulses) or control or tachometer pulses (CTL: one pulse signal, one direction signal).
- Regeneration of a read LTC.
- Conversion of read LTC to LTC of a different frame rate.
- With the VITC option: conversion of LTC to VITC.
- Free-running LTC generator.

The pulses are counted in the format hours:minutes:seconds:frames, with the frames counted up to 24 (0 - 23) or 25 (0 - 24) or 30 (0 - 29) respectively, depending on the selected frame rate. The current count is generated as "time" of the Time Code, the "user bits" of the Time Code may be set freely. The frequency of the pulses may be selected between 1 pulse/frame and 63 pulses/frame, i.e. 25Hz - 1575Hz at play speed with 25 frames. A conversion with different frame rates may also be adjusted:

24 → 25, 24 → 30, 25 → 24, 25 → 30, 30 → 24, 30 → 25, 24 → 29.97, 25 → 29.97.

The LTC generator always operates in a "Jam Sync" mode, i.e. if an external LTC is read, these values will be regenerated. A time offset may be selected, i.e. it is possible to compensate or intentionally generate a time offset between the read and generated Time Code. If counting pulses and external LTC are available at the same time, the pulses are used for conversion purposes only in case of failure of the external LTC. For such parallel operation, the Jam Sync function has to be set to flywheel=0.

LTC is generated in "forward" direction if the readout LTC resp. the pulses are identified as forward (up-counting). LTC is generated in "reverse" direction if the readout LTC resp. the pulses are identified as down-counting.

The LTC output frequency may vary within a range of 20 - 50 frames/second, e.g. in case of synchronisation to an external LTC or to pulses. If the synchronisation source supplies a frequency within this range, the LTC may be phase locked and synchronised, with the time values being generated continuously. At higher frequencies the time values will be discontinuous with time leaps, at lower frequencies the time values will be discontinuous with output of equal time values. The counting of pulses is independent of the LTC output and always correct at all frequencies occurring during normal operation (up to some 100 kHz).

In case there are no pulses nor an external LTC available, the generator will output the same LTC values or disable this function, depending on the current selection.

The generator may be synchronised to the external LTC (source), to the counting pulses (tacho), to a video signal (video), to an internal x'tal (free) or to an external synchronising signal.

Three different profiles may be stored and loaded separately.

The AV-TC 30 CBL may be enhanced with the following modules:

- VITC generator: VITC is generated identical to LTC.
- Serial interface RS232 or RS422 for remote control and Time Code transfer.

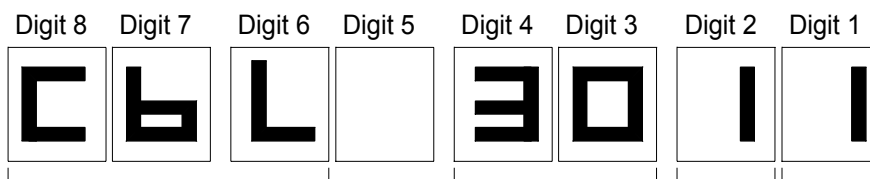
## 2 After Power-On

After power-on the stored data of the last current setting will be tested. In case of a storage error a "reset" will be made, i.e. the factory settings will be restored and written into the non-volatile memory as well. During this operation the display indicates **reset**.

The data of the three separately stored profiles (**store** function) will be loaded without testing; the data will be tested with activating the **load** function.

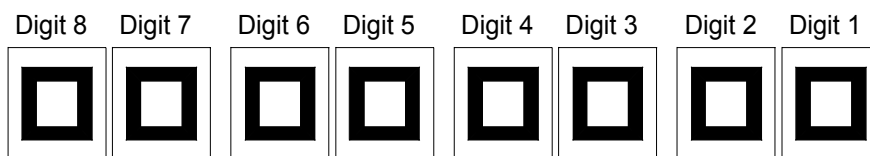
Then, status messages are displayed in three steps, and all LEDs light up for testing purposes. Step 1 indicates the unit identification, software version and built-in modules, step 2 indicates the offset for the Jam Sync function, step 3 indicates the parameters of the pulses.

Step 1 e.g.:

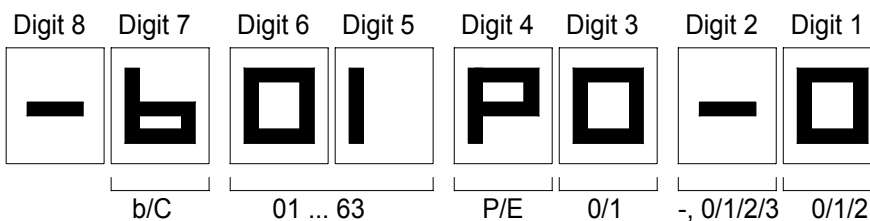


- Digits 6 to 8 indicate the unit type AV-TC 30 CBL.
- Digit 5 is blank in the standard version, a special version indicates "o".
- Digits 4 and 3 indicate the software version (e.g. 3.0).
- Digit 2 indicates the presence of a VITC module: 0=no, 1=yes.
- Digit 1 indicates the presence of a serial interface (remote module): 0=no, 1=yes.

Step 2 indicates the offset for the Jam Sync function, i.e. a time as hours: min: sec: frames, which the generator will add to the readout LTC. This offset will be preset by keys.



Step 3 indicates the parameters of the pulses:



- Digit 7: selection between biphase (b) or CTL (C).
- Digit 6 and 5: number of pulses/frame.
- Digit 4: P: synchronisation to pulses. E: synchronisation to EXT SYNC.
- Digit 3: synchronisation to falling (0) or rising (1) edge.
- Digit 2: 0/1/2/3 in CTL mode, "-" with biphase.
- Digit 1: stand-by mode off (0) or on (1 or 2).

---

### 3 Display of Time, User Bits and Lock Status

Pressing the keys **time** or **user** switches the display to time (count values) or user bits of the Time Code. The corresponding LED is lighting.

If the LTC generator is synchronised by **tacho** or **source**, the sync pulse frequency may vary. A decimal point beside the unit frames of the display will be lighting if the AV-TC 30 CBL identifies "LOCK", i.e. a stable sync frequency at normal speed.

### 4 Frame Rate

The selected frame rate is indicated by the corresponding LED. With a 1:1-conversion one of the LEDs is lighting, the frame rates of input and output signal are equal:

LED **24** lighting: frame rate of generated and of read LTC = 24, feed frequency of the pulses is a multiple of 24 at normal speed (24Hz, 48Hz ... 1512Hz).

LED **25** lighting: frame rate of generated and of read LTC = 25, feed frequency of the pulses is a multiple of 25 at normal speed (25Hz, 50Hz ... 1575Hz).

LED **30** lighting: frame rate of generated and of read LTC = 30, feed frequency of the pulses is a multiple of 30 at normal speed (30Hz, 60Hz ... 1890Hz).

LED **30** flashing: frame rate of generated and of read LTC = 30Drop. If the AV-TC 30 CBL is operated with this setting as a free-running generator, the output frequency will be = 29.97 frames/second.

With conversion else than 1:1, two of the LEDs will be lighting, corresponding to the frame rates of the input and output signal, e.g. with 24 → 25 (converting 24Hz or 48Hz to a 25 Time Code) the LEDs 24 and 25 will be lighting.

The frame rates may be selected in the setting mode:

press **set** key, then **frame rate** key. The display indicates the current selection. Every pressing of the **frame rate** key switches the display to the next setting, pressing the **set** key stores the new setting:

# Operating Manual AV-TC 30 CBL

	<b>Display</b>	<b>Frame rate/Operating mode</b>
	24Fr	input and output = 24, conversion 1:1
	25Fr	input and output = 25, conversion 1:1
	2997	input and output = 30 (non drop), conversion 1:1
	30Fr	input and output = 30 (non drop), conversion 1:1
	30dF	input and output = 30 drop mode, conversion 1:1
Con	2425	input = 24, output = 25, conversion 24 → 25
Con	2430	input = 24, output = 30, conversion 24 → 30
Con	243d	input = 24, output = 30, conversion 24 → 30 drop
Con	2524	input = 25, output = 24, conversion 25 → 24
Con	2530	input = 25, output = 30, conversion 25 → 30
Con	253d	input = 25, output = 30, conversion 25 → 30 drop
Con	3024	input = 30, output = 24, conversion 30 → 24
Con	3025	input = 30, output = 25, conversion 30 → 25
Con	2429	input = 24, output = 30 (non drop), conversion 24 → 29.97 (please notice chap. 11)
Con	2529	input = 25, output = 30 (non drop), conversion 24 → 29.97 (please notice chap. 11)

## **Note to 2997:**

With this selection the output frequency of the free-running generator (sync = **free**) will be 29.97Hz. The frames are counting up 00 - 29, non-drop mode.

The difference to the selection = "30Fr": same counting, but output frequency = 30Hz.

The difference to the selection = "30 dF": same output frequency, but counting in the drop mode.

With conversion else than 1:1 and with synchronisation = **tacho** or = **source**, the output frequency will be locked to the input frequency, thus the exact output frequency depends on the input. See chapter 11 for conversion to 29.97Hz as well.

---

## 5 Pre-Set of Start Values

In the operating mode "free-running generator" or if no external LTC is read, the generator may be pre-set to a start value. There should be no counting pulses during the pre-set operation to ensure that the generator then starts counting from the start value with the next pulses only. In the operating mode "free-running generator" the generator will continue counting immediately after transfer of the start value beginning there.

Press **set** key, then **time** key. The last set start value is displayed.

Press **hours** key to set the hours within a range of 00 - 23.

Press **minutes** key to set the minutes within a range of 00 - 59.

Press **seconds** key to set the seconds within a range of 00 - 59.

Press **frames** key to set the frames within a range of 00 - 23/24/29 respectively, according to selected frame rate.

Press **frame rate** key to set the display to 00 00 00 00.

Having set a new start value press **time** to save the new values and to quit the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the new values.

## 6 Pre-Set of User Bits

If in the operating mode "free-running generator" or if no user bits of an external LTC are read (time Jam Sync only), the user bits may be pre-set.

Press **set** key, then **user** key. The current user bits are displayed.

Press **hours** key to adjust digits 7/8 within a range of \$00 - \$FF.

Press **minutes** key to adjust digits 5/6 within a range of \$00 - \$FF.

Press **seconds** key to adjust digits 3/4 within a range of \$00 - \$FF.

Press **frames** key to adjust digits 1/2 within a range of \$00 - \$FF.

Press **frame rate** key to set the display to 00 00 00 00.

Having set new user bits press **user** key to save the new values and to quit the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the new values.

## 7 Jam Sync Function

The generator generally executes a Jam Sync function, i.e. as soon as a LTC is read from input LTC IN, the generator will regenerate these values - except with operating mode "free-running generator". An offset may be set for the LTC time - see below.

### Jam Sync at conversion 1:1:

If the incoming time is continuously counting upward or downward at normal speed, the generator outputs a regenerated Time Code identical to the incoming Time Code (internal pre-count). If a "still" Time Code is read, i.e. always the same time values, these very values will be regenerated without pre-count.

### Jam Sync at a frame rate conversion mode:

With conversion else than 1:1 (see chapter 4), the generator accepts the reader values only under certain conditions. The process starts with a frame-accurate synchronisation of the generator to the reader values, then the generator continues to count automatically and continuously.

With conversion 24 → 29.97 and 25 → 29.97 the generator does not accept reader values during "LOCK" state (see chap. 11).

At all other conversion modes the generator accepts reader values only at a new second (frames = 00) and only at a difference in time > 2 seconds. A new synchronisation process starts if this difference will be detected.

To set regeneration of time and user bits, or of time only, press **jam** key. Current selection is indicated by the LED **jam mode**:

LED **jam mode** lighting:                      time and user bits are transferred from reader to generator.

LED **jam mode** not lighting:                only time is transferred to the generator, the user bits as selected in the setting mode are generated.

The **jam sync** LED is lighting as soon as a valid LTC is identified at the reader input and transferred to the generator.

To achieve a **drop out-compensation**, i.e. a correct regeneration of a faulty or fragmentary LTC, a "flywheel" may be programmed. Please note that this "flywheel" has to be set = 0 for conversion of pulses to LTC. "Flywheel" means that the LTC generator will automatically continue counting the selected number of frames even if no new values are recognised. This function will only be useful if no synchronisation to LTC is made, but e.g. to video. Programming as follows:

Press **set** key, then **frames** key, and the current setting is displayed.

Pressing **time** key counts upward, pressing **user** key counts downward. Range: **00-99**.

Pressing the **frames** key saves the settings and quits the setting mode.

Pressing the **set** key quits the setting mode without saving any settings.

---

## 8 Display and Modification of Jam Sync Offset

The Jam Sync Offset serves to compensate for or to create a time difference between input LTC and regenerated LTC. The generator adds this time to the read time before regenerating it.

A "minus" offset of e.g. 2 frames will be achieved by setting an offset of 23:59:59:23 (with frame rate = 25).

Press **set** key, then **source** key to display the current offset.

Press **hours** key to set the hours within a range of 00 - 23.

Press **minutes** key to set the minutes within a range of 00 - 59.

Press **seconds** key to set the seconds within a range of 00 - 59.

Press **frames** key to set the frames within a range of 00 - 23 or 24 or 29 depending on the selected frame rate.

Press **frame rate** key to set the display to 00 00 00 00.

Having set new offset values press **source** key to save the new values and to quit the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the new values.

## 9 Synchronisation Source

To select the synchronisation source use one of the keys **tacho**, **video**, **free** and **source**. The following synchronisation sources are selectable:

- count pulses or external sync pulse (BNC input EXT SYNC) - press **tacho** key,
- video signal - press **video** key,
- internal x'tal - press **free** key,
- readout LTC - press **source** key.

Synchronisation means that the LTC output signal of the generator is phase-locked to the sync signal as long as the frequency of the signal lies within the normal speed range. If the frequency exceeds this range, an automatic switch to the internal x'tal is made, with the **free** LED lighting in addition to the LED of the selected source.

**source** Synchronisation to an external LTC. This mode should be selected if an existing LTC is to be read and regenerated with no stable sync available. To enable a video lock in this application, select the synchronising mode **video**. The **source** LED will be lighting as long as the generator is phase-locked, otherwise the **free** LED will be lighting as well. In case of a conversion with different frame rates (e.g. 24 → 25), the internal reference will be tuned to the external LTC in a way that with frames = 00 the phases will coincide. This only does not apply to conversion 24 → 29.97 or 25 → 29.97.

**video** Select video synchronisation if you wish to lock the LTC output to the video, e.g. with the operating mode "free-running generator", with LTC regeneration (see **source**), with conversion LTC → VITC (VITC option), or in case of a conversion of standards between the video systems 525/60 ↔ 625/50 (conversion LTC 30 ← → 25).

**free** Synchronisation to internal x'tal. This synchronising mode should be selected in the operating mode "free-running generator" only. The output frequencies of the LTC are with frame rate:

24	= 24,
25	= 25,
30	= 30,
30drop	= 29.97.

**tacho** Synchronisation to counting pulses or to an external sync signal at the EXT SYNC IN input. To switch between counting pulses or external signal use setting mode for counting pulses (refer to next chapter). Additionally the **free** LED will be lighting if the frequency of the sync signal is not within the normal speed range. In case of a conversion with different frame rates (e.g. 24 → 25), the internal reference will be tuned to the counting pulses in a way that with frames = 00 the phases will coincide. This only does not apply to conversion 24 → 29.97 or 25 → 29.97.

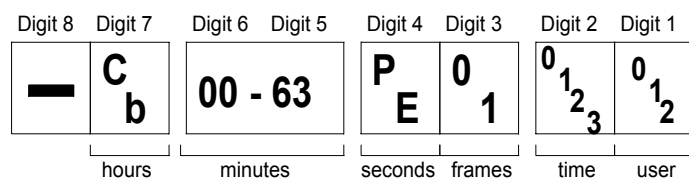
## 10 Adjustment of Pulse Counting and Synchronisation

Various parameters have to be adjusted to ensure correct counting and synchronisation in order to achieve a frame-accurate conversion of pulses → LTC.

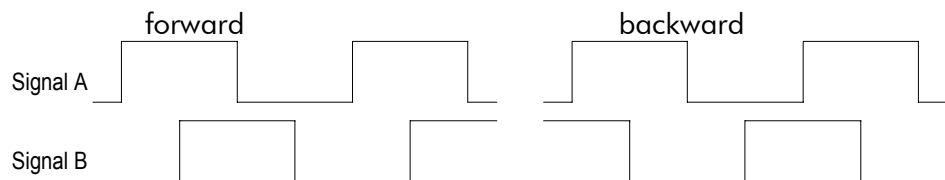
Please remember to set the drop out-compensation to flywheel=0 - see chapter 8.

Press **set** key, then **tacho** key to enable the corresponding setting mode. The display indicates the current selected status; other selections can be made using the keys **hours**, **minutes**, **seconds**, **frames**, **time** and **user**. Press **set** key to quit the setting mode and save the new selection.

The assignments of keys to digits and the possible settings are as follows:



Digit 7: Counting biphasic or CTL pulses, select by pressing the **hours** key. **b** = biphasic. Biphasic consists of two square wave signals A and B with a phase shift of 90°, which permits determination of the counter direction (forward/reverse). Signal A is connected to pin 1, signal B to pin 3 of the DIN5F connector.



**C** = CTL (control pulse or tachometer pulse). Pulse and direction signal are separated. The direction is indicated by a static level. The CTL pulse is connected to pin 4, CTL direction to pin 5 of the DIN5F connector.

Digits 5/6: Number of pulses per Time Code frame, select by pressing the minutes key. Serves to indicate or adjust the number of pulses/frame, separately for biphasic or CTL (see digit 7). The number shown in the digits indicates the number of pulses per LTC frame at normal speed, i.e. at frame rate = 25 the 1 indicates 25Hz, the 2 indicates 50Hz... With conversion else than 1:1, e.g. 24 → 25, this indication refers to the (virtual) input frame, in this case the 1 indicates 24Hz, the 2 indicates 48Hz... The valid range is 01 - 63.

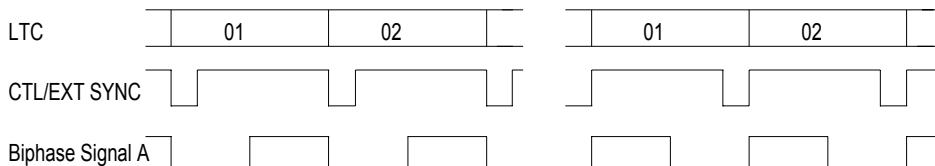
*Note: In this case, the **tacho** key has to be pressed to store any changes!*

If the frequency is not known, the AV-TC 30 CBL provides an automatic adjustment. The pulses to be measured have to be stable at normal frequency and have to be identified as "forward" pulses (see also digit 2, direction signal). Select value 00 and press tachometer key. It will take approx. 9 seconds time until measurement has been made and value will be displayed. If this value lies beyond the valid range, 00 will be displayed, otherwise press tachometer key to save this value.

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Digit 4: Synchronisation to pulses or to EXT SYNC IN, select by pressing the **seconds** key.  
**P** = The synchronising pulse will be deducted from the counting pulse provided that synchronising mode has been selected with the **tacho** key (**tacho** LED is lighting). With biphas mode synchronisation is made to signal A, with CTL mode to the CTL pulse. A frequency divider ensures that the number of pulses/frame is taken into account.  
**E** = An external pulse at the **EXT SYNC IN** input serves as the synchronisation source. 1 pulse/frame is required, in addition, the **tacho** key has to be pressed to select this synchronising mode (**tacho** LED is lighting).

Digit 3: Select edge of the synchronising pulse by pressing the **frames** key.  
This setting is relevant only with a frequency of 1 pulse/frame.  
**0** = synchronisation to falling edge, **1** = synchronisation to rising edge.  
Example: Digit 3 = 0 Digit 3 = 1



Digit 2: Setting of CTL parameters. Select by pressing the **time** key.  
This setting is possible only with digit 7 indicating **C**. Serves to adjust whether the rising or falling edge of the CTL pulse will be counted, and whether the direction signal will indicate forward or backward with a low-level:  
**0**: falling edge = counting edge. Direction "low" = forward, "high" = reverse.  
**1**: rising edge = counting edge. Direction "low" = forward, "high" = reverse.  
**2**: falling edge = counting edge. Direction "low" = reverse, "high" = forward.  
**3**: rising edge = counting edge. Direction "low" = reverse, "high" = forward.

Digit 1: switching on/off "stand-by"; select by pressing the **user** key.  
If no pulses are available, the LTC output may be switched off, or a LTC with still values will be output:  
**0**: LTC is output with still values.  
**1**: LTC is switched off and will be switched on again immediately with the first counting pulse.  
**2**: for synchronising modes **tacho** or **source**: LTC is switched off and will be switched on again only having reached LOCK. This serves to impede other LTC readers from reading a non-synchronous LTC during the run-up phase of the source of the pulses.

## 11 Operating Mode “24 → 29.97” and “25 → 29.97”

With these operating modes the sources may be pulses or LTC, but only one of these. The basic difference to all other modes of conversion is, that each hour derived from the source the LTC output will have a delay of 108 frames. For example in the operating mode 24 → 30 one second of the source is equal to one second of the output. In the operating mode 24 → 29.97 or 25 → 29.97 each second will lead to a delay of 0.03 frames. But nevertheless the source will synchronise the output, so the delay will be exactly 108 frames (+/- one frame) each hour (of the source) even if the frequency of the source will have a small deviation. If the frequency of the source leaves the “LOCK” range the output values can be calculated using a reference value. So reaching “LOCK” again the relation of frame delay will immediately be correct and synchronised.

Please proceed as follows:

### Source = Biphase/CTL

Select sync = **tacho**.

Select drop-out compensation = **00** (see chap. 7).

As usual a start value should be set during STOP (no incoming pulses at this moment): **set - time - ... - time**. This setting fixes a reference value which enables to keep the time relation even beyond the “LOCK” range. This calculation is restricted to the range “start value +/- 12 hours”! If for example a fast forward is done for as longer as 12 hours a time discontinuity will happen. This does not apply if the generator stays in “LOCK”: once it is locked, it will go on counting continuously and will stay synchronised for all times.

### Source = LTC

Select sync = **source**.

Select drop-out compensation = **02** or **>02** (see chap. 7).

Also in this mode a start value must be set, even if the value has no importance - it will be overwritten with the next read LTC. But the function “**set - time - time**” will execute an initialisation, that fixes the reference value by reaching the next “LOCK” state. Having reached this “first LOCK” the time relation will be kept by calculation even if “LOCK” becomes lost. For correct calculation the incoming LTC should not have the 24hours roll-over! If this may happen a Jam Sync Offset should be used - see chap. 8. If even a Jam Sync Offset is not suitable, everything runs well if the generator locks before reaching this critical point and then stays in lock. Once the generator is locked it will go on counting continuously and will stay synchronised for all times.

## 12 Operating Mode “Free-Running Generator“

With this operating mode, no converter function is activated, i.e. neither the data of the read LTC nor counting pulses are transferred to the generator. The generator will count up the frames (time) to generate a continuous LTC. This function is used e.g. to pre-stripe tapes. Time and user bits may be set.

- Enabling:                   press **free** key (approx. 2 seconds) until the **time** LED flashes. The internal x'tal has now been automatically selected as the synchronisation source. Nevertheless, any other source may be selected by using the keys **tacho**, **video** or **source**.
- Disabling:                 short press at **free** key.
- Alternative operation:   Keep **seconds** key pressed. Now the function may be enabled or disabled, i.e. to enable function keep key pressed until **time** LED is flashing; to disable function keep key pressed until **time** LED is lighting again. Advantageous: the synchronisation selection remains unchanged.

## 13 Factory Settings

The AV-TC 30 CBL may be set to factory settings manually (FACTORY RESET):

Press **time** and **frame rate** keys at one time for approx. 2 seconds to re-start the unit.

On delivery and following a FACTORY RESET, the standard values are as follows:

Generally, everything is set to zero or switched off, except:

- |                             |                                            |
|-----------------------------|--------------------------------------------|
| <b>Frame Rate</b>           | 25.                                        |
| <b>Synchronisation</b>      | tacho.                                     |
| <b>Counting Pulses</b>      | biphase, 2 pulses/frame, stand-by on (=1). |
| <b>LTC Reader, Jam Sync</b> | transfer of time+user, flywheel=0.         |
| <b>VITC</b>                 | 2-line mode, lines 18 and 20.              |
| <b>Serial Interface</b>     | baudrate = 9600, even parity.              |

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## 14 Loading and Storing of Profiles

Three different profiles may separately be stored and loaded. Before loading the profiles for the first time, store plausible settings in the three storage areas. The current settings may e.g. be stored in area 1, then select different settings for a second profile which will be stored in area 2, and again a third profile in area 3.

To enable loading and storing of the profiles press **set** key, then press **free** key. The display shows the function to be executed. Select the required function with **frames** key, then press **set** key to execute the function. Press **free** key again to leave the setting mode without executing a function.

<b>Display</b>	<b>Function</b>
<b>LOAd 1</b>	AV-TC 30 CBL re-starts with the settings of storage area 1
<b>LOAd 2</b>	AV-TC 30 CBL re-starts with the settings of storage area 2
<b>LOAd 3</b>	AV-TC 30 CBL re-starts with the settings of storage area 3
<b>STOrE 1</b>	The current settings will be written into storage area 1
<b>STOrE 2</b>	The current settings will be written into storage area 2
<b>STOrE 3</b>	The current settings will be written into storage area 3

If the display shows **reset** after load function, the data of this area were not valid. AV-TC 30 CBL then refers to the factory settings. Execute the store function for this area to have valid data stored.

## 15 Key Functions, Overview

Key	Function
<b>set</b>	Enables or disables the setting mode.
<b>hours</b>	In setting mode only: <ul style="list-style-type: none"> <li>• modifies "hours" when setting time, user, Jam Sync Offset</li> <li>• selects the 1<sup>st</sup> line of the VITC adjustment</li> <li>• selects biphas/CTL in mode "set - tacho"</li> </ul>
<b>minutes</b>	In setting mode only: <ul style="list-style-type: none"> <li>• modifies "minutes" when setting time, user, Jam Sync Offset</li> <li>• selects the 2<sup>nd</sup> line of the VITC adjustment</li> <li>• selects number of pulses/frame in mode "set - tacho"</li> </ul>
<b>seconds</b>	In setting mode only: <ul style="list-style-type: none"> <li>• modifies "seconds" when setting time, user, Jam Sync Offset</li> <li>• selects the block/line mode of the VITC adjustment</li> <li>• selects synchronisation source =pulses or = external in mode "set - tacho"</li> </ul>
<b>frames</b>	In setting mode only: <ul style="list-style-type: none"> <li>• modifies "frames" when setting time, user, Jam Sync Offset</li> <li>• modifies the values of the VITC setting</li> <li>• selects the functions for load/store</li> <li>• selects the edge of the sync pulse in mode "set - tacho"</li> </ul>
<b>time</b>	Switches display to time display. In mode "set - tacho": select CTL parameters.
<b>user</b>	Switches display to user display. In mode "set - tacho": select stand-by.
<b>tacho</b>	Synchronisation to pulses or to external sync pulse.
<b>video</b>	Synchronisation to video signal.
<b>free</b>	Internal synchronisation. Longer pressing of key: function "free-running generator".
<b>source</b>	Synchronisation to read LTC.
<b>frame rate</b>	In setting mode only: <ul style="list-style-type: none"> <li>• Selection of frame rate or converter mode.</li> <li>• Selection of baud rate/parity with option "serial interface".</li> <li>• Resets display to 0 in modes set-time, set-user, set-source.</li> </ul>
<b>jam</b>	Selection of Jam Sync mode (time or time+user).
<b>set - time</b>	Setting a start time.
<b>set - user</b>	Setting of the user bits.
<b>set - tacho</b>	Setting of the biphas/CTL functions.
<b>set - video</b>	Setting the VITC parameters.
<b>set - frame rate</b>	Setting the frame rate, converter mode.
<b>set - source</b>	Setting the Jam Sync Offset.
<b>set - frames</b>	Setting the Jam Sync drop-out compensation.
<b>set - jam</b>	Setting the serial interface.
<b>set - free</b>	Calling load/store.
<b>time + frame rate</b>	FACTORY RESET.

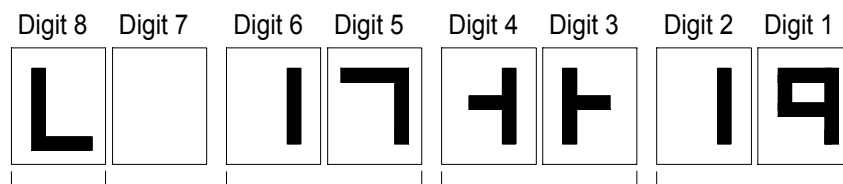
## 16 VITC Generator (optional)

This function requires a hardware module. With this module built in, the status display will show a **1** in digit 2 after power-on.

VITC is inserted in the signal at the BNC connector **Video In** and output at the BNC connector **VITC OUT**. The VITC data are identical with the LTC data. The synchronising mode **video** should be selected. The **VITC** LED will be lighting if VITC is generated.

The VITC lines are adjustable. Factory values for these lines are 18 and 20. The adjustment range is 6 - 22 with frame rates 24 and 25, 10 - 20 with frame rate 30. Selection of 2-line mode or block mode: VITC may be generated in just two non-consecutive lines or in a block of lines, defined by start line and end line.

Press **set** key, then press **video** key, and the display will show e.g.:



<b>L</b> = 2 lines mode	first line or	<b>+</b> = 2 line mode	second line
<b>b</b> = block mode	start line	<b>--</b> = block mode	or end line

The flashing field may be changed. Select field by pressing the keys:

- hours** for the first line (start line),
- minutes** for the second line (end line),
- seconds** for digit 8 = 2 lines mode or block mode.

All changes are made by pressing the **frames** key:

- 2 lines mode or block mode: press **seconds** key, then press **frames** key.
- Change first line (start line): press **hours** key, then press **frames** key repeatedly until required line is adjusted.
- Change second line (end line): press **minutes** key, then press **frames** key repeatedly until required line is adjusted.

Please note the following:

- The valid range of lines is 6-22 or 10-20 respectively.
- In the 2 lines mode only two non-consecutive lines will be accepted, line 1 < line 2.
- In the block mode line 1 <= line 2. In case line 1 = line 2, VITC will be generated in one line only.

Pressing the **video** key saves any changes made and quits the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the values.

## 17 Serial Interface (optional)

This function requires a hardware module. With this module built in, the status display will show a **1** in digit 1 after power-on.

The AV-TC 30 CBL may be remote-controlled via serial interface RS232 or RS422. The current counts or Time Code data may be inquired. The data format of 8 data bits and 1 stop bit is fixed, parity bit and baud rate may be selected.

Displaying and changing the **baud rate**:

Press **set** key, then press **jam** key, the display shows e.g.: **bd 9600**

Repeated pressing of **frame rate** key now permits to set a value of 50 - 19200.

Pressing the **jam** key saves the new value and quits the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the values.

Displaying and changing the **parity bit**:

Press **set** key, then press **jam** key twice, and the display will indicate the selected parity:

**PA 000** = no parity bit transmitted or received.

**PA 001** = odd parity bit.

**PA 011** = even parity bit.

**PA 101** = parity bit 1 transmitted, parity check disabled.

**PA 111** = parity bit 0 transmitted, parity check disabled.

Repeated pressing of **frame rate** key now permits to select the requested parity bit.

Pressing the **jam** key saves the new value and quits the setting mode.

Pressing the **set** key will quit the setting mode at any time without saving the new value.



# Operating Manual AV-TC 30 CBL

## Table of interface commands:

Command/Request					Return				
Description	CMD1	CMD2	DATA	CHECK	Description	CMD1	CMD2	DATA	CHECK
	DC				DC				
Device Type Request	\$00	\$11	-	\$11	Device Type	\$12	\$11	*1	\$CHECK
Convert 24->25	\$01	\$79	\$01	\$7B	ACK	\$10	\$01	-	\$11
Convert 24->30	\$01	\$79	\$02	\$7C	ACK	\$10	\$01	-	\$11
Convert 24->30Drop	\$01	\$79	\$03	\$7D	ACK	\$10	\$01	-	\$11
Convert 25->24	\$01	\$79	\$04	\$7E	ACK	\$10	\$01	-	\$11
Convert 25->30	\$01	\$79	\$05	\$7F	ACK	\$10	\$01	-	\$11
Convert 25->30Drop	\$01	\$79	\$06	\$80	ACK	\$10	\$01	-	\$11
Convert 30->24	\$01	\$79	\$07	\$81	ACK	\$10	\$01	-	\$11
Convert 30->25	\$01	\$79	\$08	\$82	ACK	\$10	\$01	-	\$11
Convert 24->29.97	\$01	\$79	\$09	\$83	ACK	\$10	\$01	-	\$11
Convert 25->29.97	\$01	\$79	\$0A	\$84	ACK	\$10	\$01	-	\$11
Framerate= 24, 1:1	\$01	\$80	\$24	\$A5	ACK	\$10	\$01	-	\$11
Framerate= 25, 1:1	\$01	\$80	\$25	\$A6	ACK	\$10	\$01	-	\$11
Framerate= 29.97, 1:1	\$01	\$80	\$29	\$AA	ACK	\$10	\$01	-	\$11
Framerate= 30, 1:1	\$01	\$80	\$30	\$B1	ACK	\$10	\$01	-	\$11
Framerate= 30Drop, 1:1	\$01	\$80	\$70	\$F1	ACK	\$10	\$01	-	\$11
Ssync = tacho	\$01	\$81	\$00	\$82	ACK	\$10	\$01	-	\$11
Ssync = video	\$01	\$81	\$01	\$83	ACK	\$10	\$01	-	\$11
Ssync = free	\$01	\$81	\$02	\$84	ACK	\$10	\$01	-	\$11
Ssync = source	\$01	\$81	\$08	\$8A	ACK	\$10	\$01	-	\$11
Jam-Sync = time+user	\$01	\$82	\$02	\$85	ACK	\$10	\$01	-	\$11
Jam-Sync = time only	\$01	\$82	\$04	\$87	ACK	\$10	\$01	-	\$11
VITC Block Mode	\$01	\$83	\$01	\$85	ACK	\$10	\$01	-	\$11
VITC 2-Lines Mode	\$01	\$83	\$02	\$86	ACK	\$10	\$01	-	\$11
Set VITC Lines	\$02	\$84	*2	\$CHECK	ACK	\$10	\$01	-	\$11
Set OFFSET Mode	\$01	\$87	*7	\$CHECK	ACK	\$10	\$01	-	\$11
Gen. Free Run off	\$02	\$8A	\$00	\$8B	ACK	\$10	\$01	-	\$11
Gen. Free Run on	\$02	\$8A	\$01	\$8C	ACK	\$10	\$01	-	\$11
Set Biphase Mode	\$02	\$8B	*3	\$CHECK	ACK	\$10	\$01	-	\$11
Set CTL Mode	\$02	\$8C	*4	\$CHECK	ACK	\$10	\$01	-	\$11
Set Time	\$44	\$04	*5	\$CHECK	ACK	\$10	\$01	-	\$11
Set User	\$44	\$05	*6	\$CHECK	ACK	\$10	\$01	-	\$11
Set Jam Offset	\$44	\$06	*5	\$CHECK	ACK	\$10	\$01	-	\$11
Set OFFSET value	\$44	\$07	*5,*7	\$CHECK	ACK	\$10	\$01	-	\$11
Current Time Request	\$61	\$0A	\$01	\$6C	Zeit	\$74	\$08	*5	\$CHECK
Current User Request	\$61	\$0A	\$10	\$7B	User	\$74	\$09	*6	\$CHECK

\$CHECK = the hexadecimal sum of all preceding bytes

ACK = acknowledge = o.k. return

In case of a failure or an error, a NAK (= not acknowledge) will be transmitted:  
\$11 \$12 \$ERROR \$CHECK, with \$ERROR:

Bit 7:

Bit 6: framing

Bit 5: overflow

Bit 4: parity

Bit 3:

Bit 2: check sum

Bit 1: non-plausible data

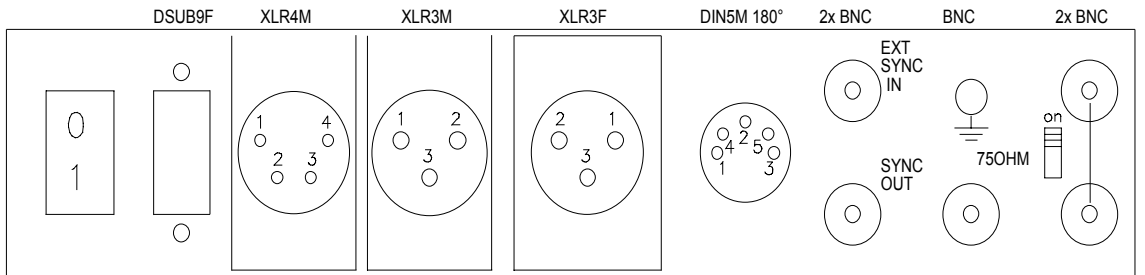
Bit 0: unknown command

## Remarks on the interface commands:

- \*1** DATA 1 = Bit 7: 0  
 Bit 6: 1  
 Bit 5: 0 Bits 7...5 = device type  
 Bit 4: 0  
 Bit 3: 1, if "CBL" module (counter + LTC reader) o.k., otherwise 0  
 Bit 2: 0  
 Bit 1: 1, if interface module o.k., otherwise 0  
 Bit 0: 1, if VITC module o.k., otherwise 0  
 DATA 2 = BCD revision of firmware
- \*2** DATA 1 = BCD value of first line or start line (note the valid range)  
 DATA 2 = BCD value of second line or end line (note the valid range)
- \*3** DATA 1 = BCD number of pulses/frame, range \$01 - \$63. With \$00 the current value remains unchanged.  
 DATA 2 = Bit 7: 1/0, stand-by on/off  
 Bit 6: 1/0, synchronisation to rising/falling edge  
 Bit 5:  
 Bit 4: 1/0, synchronisation to pulse/external sync signal  
 Bits 3..0: not used
- \*4** DATA 1 = BCD number of pulses/frame, range \$01 - \$63. With \$00 the current value remains unchanged.  
 DATA 2 = Bit 7: 1/0, stand-by on/off  
 Bit 6: 1/0, synchronisation to rising/falling edge  
 Bit 5:  
 Bit 4: 1/0, synchronisation to pulse/external sync signal  
 Bit 3:  
 Bits 1+2: adjust CTL parameters (0, 1, 2, 3, see description)  
 Bit 0:
- \*5** DATA 1 = BCD frames  
 DATA 2 = BCD seconds  
 DATA 3 = BCD minutes  
 DATA 4 = BCD hours
- \*6** DATA 1 = user digits 1+2  
 DATA 2 = user digits 3+4  
 DATA 3 = user digits 5+6  
 DATA 4 = user digits 7+8
- \*7** DATA 1 = \$00: function switched off  
 \$01: add offset (value set by command \$44 \$07)  
 \$02: subtract offset (value set by command \$44 \$07)

The OFFSET function can be activated by serial commands only. After power-on the offset value will be 0 and the function switched off. During offset function the currently generated time (count) value will be added resp. subtracted by the value set by command \$44 \$07.

## 19 Rear Panel and Technical Data



<b>ON/OFF</b>	<b>REMOTE:</b> serial interface = RS232	<b>POWER IN:</b> 1: V- (GND) 4: V+	<b>LTC OUT:</b> 1: GND 2: LTC_x 3: LTC_y	<b>LTC IN:</b> 1: GND 2: LTC_x 3: LTC_y	<b>PULSE IN:</b> 1: Biphase A 2: GND 3: Biphase B 4: CTL/Tacho Pulse 5: CTL/Tacho Direction	<b>VITC OUT</b>	<b>VIDEO IN</b> <b>VIDEO OUT (LOOP)</b>
2: RxD in	2: TxA out						
3: TxD out	3: RxB in						
4: DTR out	4: RxC (GND)						
5: GND	6: TxC (GND)						
7: RTS out	7: TxB out						
8: CTS in	8: RxA in						

**Dimensions:** 214 (W) x 43 (H) x 262 (D) mm

**Weight:** 1.5 kg approx.

**Operating temperature:** 5°C to 40°C

**Allow. humidity of air:** 35% to 85%

**Power supply:** 12 - 18V DC

**Power consumption:** typical 320mA at 14V

**LTC output:** balanced, < 50Ohm, level adjustable by rotary potentiometer (may be reached putting a small screwdriver though a hole of the top cover): 1.0Vpp (factory setting) ... 100mVpp.

**LTC input:** balanced, 47kOhm approx., input level 50mVpp - 5Vpp. Reading range 19-37 frames/second approx., 80-bit code.

**Biphase, CTL, Ext. Sync:** Logic input signals, input Low: -0.5V - +1V, input High: +3 - +15V.

**SYNC OUT:** HCMOS output of the internal synchronising pulses for the LTC generator, reference = negative edge.

## 20 Appendix: Patterns for Parameter Adjustment

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